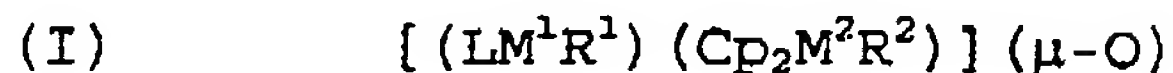


Claims:

1. A binuclear, oxygen-bridged, bimetallic complex of the general formula I:



where:

M^1 = Al, Ge, Zr or Ti;

M^2 = Zr, Ti or Hf;

Cp = cyclopentadienyl;

R^1, R^2 = H; C(1-6)alkyl; halogen; aryl; SiMe₃ and alkylaryl where aryl = C₆H_{5-n}X_n and X = halogen, C(1-6)alkyl, aryl, NO₂, SO₃H, NR³₂, where R³ = C(1-6)alkyl or H and n = 0 to 5; and

L = a bidentate, doubly heteroatom-coordinated organochemical ligand which together with the metal M¹ forms a 5- or 6-membered ring.

2. The binuclear, oxygen-bridged, bimetallic complex as claimed in claim 1, in which R¹, R² = methyl, ethyl, i-propyl, t-butyl, halogen, phenyl, alkylphenyl, SiMe₃, and L is a bidentate, doubly nitrogen-coordinated organochemical ligand which together with the metal M¹ forms a 5- or 6-membered ring.

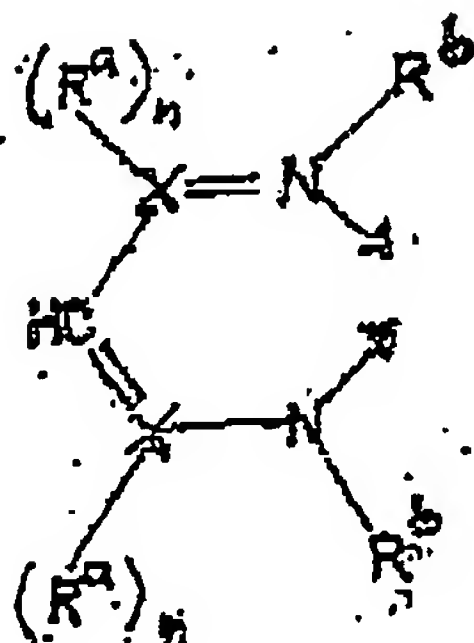
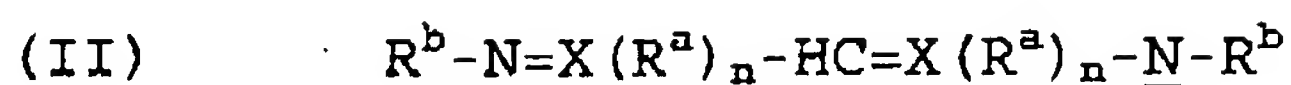
3. The bimetallic complex as claimed in claim 1 or 2, characterized in that it is a heterobimetallic complex, preferably one in which M¹ = aluminum and M² = zirconium, more preferably a complex of the formula $[(LAlMe)(Cp_2ZrR^2)](-O)$, where R² is Me or Cl.

4. The bimetallic complex as claimed in any of claims 1 to 3, characterized in that the ligand L has the following composition (formula II):

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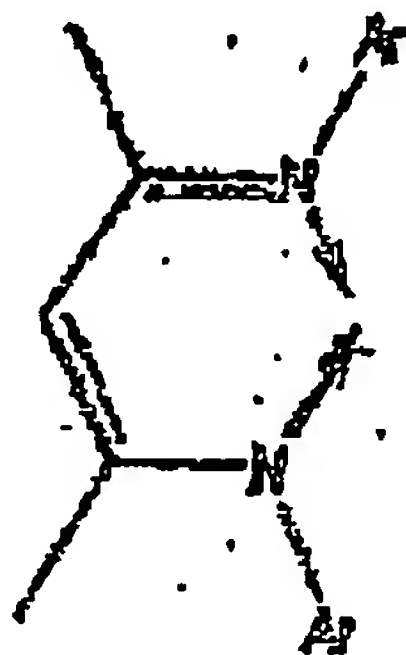
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where: $X = C$ or P ;

$R^a, R^b = R^1, R^2$; $n = 1$ when $X = C$; $n = 2$ when $X = P$.

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5. The bimetallic complex as claimed in claim 4, characterized in that the ligand L has the following composition:



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in particular with $Ar = 2,6-iPr_2C_6H_3$.

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6. A process for preparing a binuclear, oxygen-bridged, bimetallic complex as claimed in any of claims 1 to 5, characterized in that a precursor complex of the formula $LM^1R^1(OH)$ is reacted with a

metallocene precursor complex $\text{Cp}_2\text{M}^2(\text{R}^2)_2$ or $\text{Cp}_2\text{M}^2\text{MeR}^2$ or $\text{Cp}_2\text{M}^2\text{HX}$, where X = halogen, preferably in an inert solvent.

- 5 7. A catalyst preparation for the polymerization of olefins which comprises at least one complex as claimed in any of claims 1 to 5 and at least one cocatalyst.
- 10 8. The catalyst preparation as claimed in claim 7, characterized in that the cocatalyst is an alkylaluminumoxane, preferably methylaluminumoxane (MAO).
- 15 9. The use of binuclear, oxygen-bridged, bimetallic complexes comprising a transition metallocene and an organic Al, Ge, Zr or Ti compound which does not contain a cyclopentadienyl group, in particular complexes as claimed in any of claims 1 to 5, as polymerization catalysts.
- 20 10. The use as claimed in claim 9, characterized in that at least one heterobimetallic complex is used.
- 25 11. The use as claimed in claim 9 or 10, characterized in that the catalyst is used in combination with a cocatalyst of the $[\text{MeAlO}]_x$ type, trialkylaluminum or alkylhaloaluminum, in particular in combination with methylaluminumoxane (MAO).